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Preliminary Assessments and Site Inspections Report Upper Columbia River Mines and Mills Stevens County, Washington TDD: 01-02-0028

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Region 10

START-2

Superfund Technical Assessment and Response Team

Submitted To: Monica Tonel, Task Monitor
United States Environmental Protection Agency
1200 Sixth Avenue
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PRELIMINARY ASSESSMENTS AND SITE INSPECTIONS REPORT
UPPER COLUMBIA RIVER MINES AND MILLS
STEVENS COUNTY, WASHINGTON

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

Section Page

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

Section Page

TABLE OF CONTENTS (CONTINUED)

Section | Page

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

Section | Page

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

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6.16 LEROI/NORTHPORT SMELTER

6.16.1 Smelter Location

Latitude:	48° 55' 23.16"N
Longitude:	117° 46' 02.28"W
Legal Description:	Section 33, Township 40N, Range 40E
CERCLIS ID:	WAD988507323
County:	Stevens
Smelter Owner/Contact:	Murray McConnachie K.E.S. Contracting Ltd. 1252 Bay Avenue Trail, British Columbia Canada V1R 4A6 (250) 368-5222

6.16.2 Historical Information

The LeRoi/Northport Smelter is a former smelter located northeast of the town center of Northport, Washington, along Highway 25. The city of Northport is located along the east bank of the Columbia River approximately 7 miles south of the U.S.-Canada border in Stevens County. (URS 1993)

The Northport-Waneta Road borders the LeRoi/Northport Smelter site along the south and east. Highway 25 defines the western boundary of the site. The Burlington Northern Sante Fe Railway (formerly the Spokane Falls and Northern Railroad) runs parallel to the Columbia River and designates the northern site boundary. The Columbia River is located approximately 200 feet north of the LeRoi/Northport Smelter property. Properties west of the site are residential homes. Smelter Hill is located directly east of the site and Silver Crown Mountain is south of the site. A city park with an area of approximately 10 acres is located northwest of the site along the Columbia River, approximately 50 feet from the site. (URS 1993)

The property encompasses approximately 32 acres and is accessed from the Northport-Waneta Road via Highway 25 (SAIC 1997). The ground surface generally slopes toward the Columbia River in elevation from about 1,360 feet above msl at the site to 1,290 feet above msl, the normal pool elevation for the Columbia River (SAIC 1997). The former smelter buildings, which are no longer standing, included the furnace building, the roaster building, and the crusher and ore building (Heritage 1981).

Beginning in 1897, the smelter refined copper, lead, and silver ores from mines in northeast Washington, as well as copper ore from British Columbia, Canada (DHHS 1999). In 1901, the LeRoi Company smelting operations reorganized as the Northport Smelting and Refining Company

(URS 1993). By 1908, it was one of the largest smelters on the West Coast, processing 500 tons of ore per day (URS 1993). In 1909, the smelter closed because of competition from another smelter located in Trail, British Columbia (URS 1993). During World War I, the government demand for lead encouraged the Northport Mining and Smelting Company to reopen and process the lead ores that had been discovered at Leadpoint, Washington, approximately 9 miles east of Northport (URS 1993). In September 1914, Jerome Day purchased the smelter and renovated it to accommodate lead ores (URS 1993). The government curtailed its lead purchases in 1921, and subsequently, the smelter closed and was dismantled in 1922, after 24 years of sporadic operation (DHHS 1999). After the smelter closed, the American Smelting and Refining Company purchased the site. The company removed the smelting equipment and transported it to a smelter elsewhere (URS 1993). Between 1922 and 1953, the inactive site was purchased by J.D. Harms. Between 1953 and 1969, a lumber mill went into operation on the property (URS 1993). In 1975, Cecil Frazier purchased the property and operated the lumber mill (URS 1993). In 1985, Steve Frazier purchased the property and business and operated the mill under the name SSF Building Materials until the property was sold to the current owner in 2001.

6.16.3 Smelter Description/Features

Refer to Appendix F for historical site maps. The smelter, Breen Copper Smelter, operated from 1896 until 1901. The initial smelter operations were rudimentary and involved releases of large quantities of pollutants. The tellurium ore was more difficult to process; however, it contained high enough amounts of copper and gold to make the process worthwhile. Tellurium is naturally occurring and belongs to the same family of elements as selenium and sulfur. Because of the tellurium, the ore had to be burned or heated to release the minerals. The burning released high amounts of sulfur dioxide into the air. (URS 1993)

The ore was processed by heap roasting, which involves open burning of the raw ore prior to placing it in a mineral filtration furnace. The heap roasting process produced a disagreeable sulfur odor; the local citizens termed the burning piles "stink piles." Local farmers believed that the heap roasting process was poisoning the nearby soils. (URS 1993)

A slag brick platform was used for the initial burning, or heap roasting, of the ore. The ore was piled on the brick platform to an approximate depth of 4 feet. Cord wood was then stacked on top of the ore pile and ignited. The tellurium in the ore would be vaporized during this process, thus freeing the gold and copper for smelting. The location of this brick platform is where the Northport city wells are

currently located. Refer to Appendix G for Northport city wells analytical results collected by Stevens County. (URS 1993)

The burned ore was then placed into the furnace where the separation of the minerals took place. Limerock was used during the flux process. Tap holes were located at different levels in the furnace to filter the minerals and rocks (including copper, iron and slag rock). The tap hole for the iron and slag rock was located higher than the copper tap hole. The iron and slag rock collected from this filtration was considered waste. The copper mineral was collected and loaded into box cars for shipment to a copper refinery. (URS 1993)

Because gold is heavy, it settled to the bottom of the furnace and formed a gold matte. After the gold accumulated to a thickness of 14 inches, the furnace was shut down. Once the furnace and materials cooled, the sides of the furnace were removed to gain access to the gold matte, which was then pried from the furnace and cut into pieces before being loaded into box cars and shipped to a gold refinery. (URS 1993)

The lead smelter used a process more sophisticated than that used in the copper and gold process of the previous decade, although a large quantity of sulfur (approximately 30 tons per day) was still being discharged into the air. Filters for the smokestacks were added later. (URS 1993)

In the days of the copper and gold smelter, two large steam engines, fueled by coal, provided power. Both flywheel steam engines were hooked onto one long line shaft. On the other end of the line shaft, a dynamo produced 10,000 volts of electricity prior to being boosted by a generator that provided up to 100,000 volts. Once the smelter reopened to process lead ores, a high-voltage line from Canada supplied the power, and the steam plant was shut down. (URS 1993)

The abandoned and dismantled smelter remained inactive after closure in 1922. The town of Northport demolished the buildings for the usable brick. One building retained enough walls to provide an ice-skating rink during the winter. The railroad was abandoned and the tracks salvaged. (URS 1993)

The smelting operations produced a tailings waste referred to as slag. The slag was usually placed in piles near the smelter for temporary or permanent disposal. Historical photographs indicate possible tailings piles located on the northeast portion of the property. The COCs in the slag are arsenic, copper, lead, mercury, and zinc.

SSF Building Materials, when operational, was one of the largest businesses in Northport, employing from 18 to 25 people. The entire site was used for the mill. The southern half of the property maintained the main lumber operations. The northern half, which contained the smelter remnants, was used to store lumber products and old metal parts such as cars, piping, and roofing. The lumber mill

processed mostly cedar wood from rough-dimension lumber into exterior siding and exterior paneling. The mill process included cutting the wood, drying the cut wood, and shipping it. Mill operations were run on propane. All water used for the mill operations was obtained from the city water supply. The mill did not discharge to or collect water from the Columbia River. (URS 1993)

The scrap wood materials, including sawdust, were sent to Kettle Falls for the Kettle Falls Water Power Company, which burned the material for energy. Originally, the lumber mill burned the scrap wood on site inside a wigwam burner. No wood treatment or chemical use is reported in the past mill operations. (URS 1993)

Environmental concerns in the Northport area have been investigated since 1925. In 1925, the area became involved in the first international case concerning air pollution. The Washington State Department of Health and Ecology conducted an investigation of the furan and dioxin reported in the Columbia River. A PA and SI was conducted by the EPA in 1993. The site inspection stated antimony, arsenic, copper, and lead were potentially deposited on site as a result of the former smelter operations, as they were detected on site at significant concentrations. (URS 1993)

Ecology sampled soil and slag piles at the LeRoi/Northport Smelter in 1997. Sample results showed levels of metals two or three orders of magnitude above background. Concentrations of up to 1,010 mg/kg arsenic; 337 mg/kg cadmium; 33,400 mg/kg copper; 20,200 mg/kg lead; and 1,750 mg/kg zinc were detected (Gregory 2000a). Ecology planned to conduct a groundwater investigation at the site; however, due to availability of resources, this has not been pursued (Gregory 2000b).

6.16.4 START-2 Smelter Visit

On June 29 and September 13, 2001, the START-2 visited the LeRoi/Northport Smelter and conducted a visual inspection of the property and surrounding area (Figure 6-16; Appendix A, Photos 33-1 through 34-4, 42-1 through 42-8, 46-4 through 46-10; Appendix B, Boat Team, Pages 13 through 17; Team 1 Phase 2, Page 15; Team 2 Phase 2, Pages 20 through 22). The START-2 and EPA personnel observed areas of black glassy sand-like material along the bank of the Columbia River. A public boat launch is located directly over this material. The START-2 characterized the material as slag. Sediment samples were collected at the Columbia River from locations near the boat launch and sand bar/beach area.

On September 13, 2001, the START-2, the EPA TM, Don Hurst of Fulcrum Environmental, and the property owner conducted a walk-through of the property. An area where slag bricks had been deposited was observed south of the former smelter operations. A potential former tailings pile was

observed west of the slag brick area. City water wells were observed on the former LeRoi/Northport Smelter property. The START-2 collected sediment and soil samples from locations on the property. Water samples were not collected from the City supply wells because local officials did not grant EPA permission to access the wells to collect samples.

6.16.5 Sampling Locations

Sample locations are depicted in Figures 6-17 and 6-18. Three surface soil samples (NSSL01SS through NSSL03SS) were collected west of the former tailings area underneath the slag bricks. The samples were collected within the overland surface water drainage routes identified by the START-2. The samples were collected to determine potential contamination associated with this source. The samples appeared to consist of very fine to medium grained sand with sandy reddish slag and yellowish stain. No odor was noted during sample collection.

Nine sediment samples (NSSL01SD through NSSL09SD) were collected from slag areas along the Columbia River adjacent to the smelter (PPE 3). The samples were collected within the overland surface water drainage routes identified by the START-2. The samples were collected to determine potential contamination associated with this source in the Columbia River. The samples appeared to consist of dark brown to black medium sand. No odor or staining was noted during sample collection.

Sediment sample NSPP01SD was collected at the confluence of the former tailings pile and the ditch (PPE 1). The sample appeared to consist of saturated, light brown silt. No odor or staining was noted during sample collection

One sediment sample (NSDT01SD) was collected in the western portion of a recently constructed ditch where the former tailings pile potentially was located (PPE 2). The sample was collected within the overland surface water drainage routes identified by the START-2. The sample was collected to determine whether potential contamination associated with the tailings pile is migrating to surface water. The sample appeared to consist of light brown sand fine to medium coarse grained. No odor or staining was noted during sample collection.

6.16.6 Analytical Results

6.16.6.1 Surface Soil Sample Results

The START-2 collected three surface soil samples from tailings for TAL metals analyses. Significant concentrations of arsenic ranged from 209 mg/kg to 297 mg/kg. Significant concentrations of cadmium ranged from 26.9 mg/kg to 105 mg/kg. Significant concentrations of copper ranged from

2,430 mg/kg to 14,700 mg/kg. Significant concentrations of lead ranged from 2,600 mg/kg to 10,500 mg/kg. Significant concentrations of mercury ranged from 0.28 mg/kg to 0.40 mg/kg. Significant concentrations of zinc ranged from 978 mg/kg to 5,420 mg/kg. Refer to Table 6-8 for complete data results.

6.16.6.2 Sediment Sample Results

The START-2 collected 9 sediment samples from slag areas along the Columbia River (PPE 3) for TAL metals analyses. One sediment sample was also analyzed for pesticide/PCBs and TOC. Significant/elevated concentrations of arsenic ranged from 7.5 mg/kg to 41.4 mg/kg. Significant/elevated concentrations of cadmium ranged from 1.5 mg/kg to 4.9 mg/kg. Significant/elevated concentrations of copper ranged from an estimated concentration of 238 mg/kg to an estimated concentration of 2,960 mg/kg. Significant/elevated concentrations of lead ranged from 230 mg/kg to 845 mg/kg. Mercury was detected at a significant/elevated concentration of 0.29 mg/kg. Significant/elevated concentrations of zinc ranged from 1,520 mg/kg to 16,900 mg/kg. Refer to Table 6-9 for complete data results.

The START-2 collected two sediment samples from on-site ditches potentially adjacent to former tailings piles (PPE 1 and PPE 2) for TAL metals analyses. Arsenic was detected at elevated concentrations ranging from 17.6 mg/kg to 39.9 mg/kg. Cadmium was detected at elevated concentrations ranging from 2.6 mg/kg to 5.9 mg/kg. Copper was detected at elevated concentrations ranging from 124 mg/kg to 1,090 mg/kg. Lead was detected at elevated concentrations ranging from 87.1 mg/kg to 887 mg/kg. Zinc was detected at elevated concentrations ranging from 92.2 mg/kg to 223 mg/kg. Refer to Table 6-10 for complete data results.

6.17 BLACK ROCK MINE/MILL

6.17.1 Mine/Mill Location

Latitude:	48° 52' 13.45"N
Longitude:	117° 42' 22.12"W
Legal Description:	Section 24, Township 39N, Range 40E
CERCLIS ID:	WAN001002369
County:	Stevens

and gullies developed on the walls. A small berm has been made around the tailings piles to contain eroded material and is effective in containing eroded material. The owner is testing erosion control methods on the tailings pile walls. (Boise Cascade Corporation 1997)

7.6 LEROI/NORTHPORT SMELTER

7.6.1 Surface Water Pathway Description

The potential source areas at the LeRoi/Northport Smelter include an area where slag bricks had been deposited south of the former smelter operations, and a potential former tailings area west of the slag brick area. The former tailings pile area was adjacent to a recently constructed ditch (PPE 1; Figure 6-16).

For the tailings pile, drainage enters a constructed ditch, PPE 1 and PPE 2, for the surface water pathway. The overland distance between the tailings pile and the ditch is estimated to be less than 100 feet for PPE 2. The tailings pile extends into the ditch at PPE 1. From the PPEs, the surface water TDL continues approximately 0.05 mile through the constructed ditch, which empties into the Columbia River. The surface water TDL concludes 14.95 miles downstream in the Columbia River.

The slag pile is located on the shore of the Columbia River (or Lake Roosevelt). The source area extends into the Columbia River (PPE 3). From PPE 3 the surface water TDL concludes 15 miles downstream in the Columbia River.

The Columbia River (or Lake Roosevelt) has a flow rate of 116,500 cfs as measured at the U.S.-Canada border (USGS 2002).

The average annual precipitation is 19.43 inches in Northport, Washington (WRCC 2002). The 2-year, 24-hour rainfall event for the area ranges from 1.4 to 2.0 inches (NOAA 1973).

Soils in the area of LeRoi/Northport Smelter were mapped as Hagen sandy loam, 0 to 15 percent slopes. The soil is very deep, somewhat excessively drained soil on terraces. The permeability of the soil is moderately rapid in the upper part and very rapid in the lower part. The available water capacity is moderate. Runoff is slow. The hazard of water erosion is slight to moderate, and the hazard of wind erosion is high. (USDA 1982)

Approximately one upgradient acre of land is expected to drain through the source area at the mine (USGS 1969c). The drainage area of sources is approximately 33 acres (USGS 1969c).

The LeRoi/Northport Smelter lies within a 100-year flood plain (FEMA 1990).

No containment features such as runoff control exist at the property.

7.6.2 Soil Exposure Pathway Description

A boat launch is located near the slag deposited along the bank of the Columbia River. No residents are located at the site. No school or day care facility is located within 200 feet of the site. There are no worker's within 200 feet of any source on site. The LeRoi/Northport Smelter is located within the city limits of Northport. Based on USGS topographic maps, the START-2 assumes 336 people reside within a 1-mile travel distance from the site. No residents are located at the site. The nearest residence is located 0.22 miles southwest from the site. No school or day care facility is located within 200 feet of the site. There are no workers within 200 feet of any source on site. A city park is located approximately 50 feet from the north boundary of the site. The park is accessed by means of a road on the southwest corner of the site. Access to the site is not restricted. Sources at the site are not fenced. No resources such as commercial agriculture, silviculture, or livestock production or grazing exist on a source area at the site. No wetlands are located on a source area at the site.

7.7 BLACK ROCK MINE/MILL

7.7.1 Surface Water Pathway Description

The potential source areas at the Black Rock Mine/Mill include a waste rock pile, shaft, remnants of a mill building, and two sorting bins. No PPEs were identified by the START-2 (Figure 6-19).

Although no PPEs exist at the site, the nearest surface water body is Deep Creek, located approximately 950 feet from the waste rock pile and collapsed mill source areas. From this location, the surface water TDL continues 7.07 miles in Deep Creek to the confluence with the Columbia River. The surface water pathway TDL concludes 7.93 miles downstream in the Columbia River.

The average annual precipitation is 19.43 inches in Northport, Washington (WRCC 2002). The 2-year, 24-hour rainfall event for the area ranges from 1.4 to 2.0 inches (NOAA 1973).

Soils in the area of Black Rock Mine/Mill were mapped as Waits-Rock outcrop complex, 40 to 65 percent slopes. The soils in this complex are very deep and well drained on side slopes of foothills. The permeability of the soil is moderate, and the available water capacity is very high. Runoff is very rapid, and the hazard of water erosion is very high. (USDA 1982)

Approximately 660 upgradient acres of land is expected to drain through the source area at the mine (USGS 1992a). The drainage area of sources is approximately 7 acres (USGS 1992a).

The Black Rock Mine/Mill does not lie in a flood plain (FEMA 1990).

No containment features such as runoff control exist at the property.

8.1.5 Van Stone Mine/Mill

Samples were collected from potential contaminant source areas at the Van Stone Mine/Mill including a waste rock pile, two tailings piles, 7 stained soil areas, and mine pit water. Four PPE samples were also collected.

Surface soil samples collected from source areas contained significant concentrations of TAL metals including cadmium (940 mg/kg), lead (181,000 mg/kg), mercury (6.0 mg/kg), and zinc (431,000 mg/kg).

The PPE samples contained elevated concentrations of TAL metals including cadmium (11.9 mg/kg) and zinc (3,670 mg/kg).

In the past, the mine, slurry flume, and tailings piles were likely a source of sediment to streams in the Onion Creek watershed. Based on aerial photo evidence and anecdotal reports from area residents, the slurry flume periodically broke, and the tailings slurry was dumped into the stream north of the old tailings pile for hours at a time before the break was discovered and repaired. In addition, it is reported that the old tailings pile wall was breached at least once in the past, transporting tailings material into the stream. (Boise Cascade Corporation 1997)

The new tailings pile is not reported to have had any major erosion occurrences; however, there is a layer of tailings material several feet thick covering the stream valley north of the new tailings pile (Boise Cascade Corporation 1997).

At present, the steep outer walls of the tailings piles are subject to surface erosion, as evidenced by the rills and gullies developed on the walls. A small berm has been made around the tailings piles to contain eroded material and is effective in containing eroded material. The owner is testing erosion control methods on the tailings pile walls. (Boise Cascade Corporation 1997)

Analytical results of samples collected indicate that hazardous substances are migrating to targets/receptors.

Based on an evaluation of technical data using the EPA HRS model criteria, further action under CERCLA or other authorities is recommended at the Van Stone Mine/Mill site.

8.1.6 LeRoi/Northport Smelter

Samples were collected from potential contaminant source areas at the LeRoi/Northport Smelter including surface soil west of the former tailings area underneath slag bricks, sediment from slag areas along the Columbia River adjacent to the smelter (PPE 3), and sediment in the western portion of the recently constructed ditch where the former tailings pile was located (PPE 1 and PPE 2).

Surface soil samples from source areas contained significant concentrations of TAL metals including arsenic (297 mg/kg JL), cadmium (105 mg/kg), lead (10,500 mg/kg), mercury (0.40 mg/kg), and zinc (5,420 mg/kg).

Sediment samples collected from the Columbia River contained elevated concentrations of TAL metals including arsenic (41.4 mg/kg), cadmium (4.9 mg/kg), copper (2,960 mg/kg), lead (845 mg/kg JK), mercury (0.29 mg/kg), and zinc (16,900 mg/kg).

The ditch PPE samples contained elevated concentrations of TAL metals including arsenic (39.9 mg/kg JK), cadmium (5.9 mg/kg JK), copper (1,090 mg/kg), lead (887 mg/kg JK), and zinc (223 mg/kg).

Analytical results of samples collected indicate that hazardous substances are migrating to targets/receptors.

Based on an evaluation of technical data using the EPA HRS model criteria, further action under CERCLA or other authorities is recommended at the LeRoi/Northport Smelter site.

8.1.7 Black Rock Mine/Mill

Samples were collected from potential contaminant source areas at the Black Rock Mine/Mill including a waste rock pile and soil near the collapsed mill building. No PPEs were identified by the START-2.

Soil samples collected from source areas contained significant concentrations of TAL metals including cadmium (1,630 mg/kg), lead (6,520 mg/kg), mercury (26.4 mg/kg) and zinc (402,000 mg/kg).

Based on an evaluation of technical data using the EPA HRS model criteria, no further action under CERCLA is recommended at the Black Rock Mine/Mill site.

8.1.8 Great Western Mine

Samples were collected from potential contaminant source areas at the Great Western Mine including two waste rock piles. No PPEs were identified by the START-2.

Samples collected from the waste rock piles contained significant concentrations of TAL metals including cadmium (490 mg/kg JL), lead (24,000 mg/kg), mercury (4.3 mg/kg), and zinc (118,000 mg/kg JK).

Based on an evaluation of technical data using the EPA HRS model criteria, no further action under CERCLA is recommended at the Great Western Mine site.